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2007
2008

APPLIANCES / MACHINES / SWITCHBOARD SAFETY

METREL®

CE MultiTester
MultiServicer
OmegaPAT, BetaPAT
AlphaPAT
AlphaGT
AutoPAT
PAT Demoboard

Electrical safety verification of machines, portable electrical appliances and switchgear with advanced digital measuring instruments.

Do you develop, manufacture or service electrical appliances, machines or switchgear?
Assure electrical safety of your product!

- Complete selection of test instruments for different applications and environments. Designed to be used in laboratories, workshops, automated production lines and building sites.
- Advanced, processor backed-up design enables time-efficient and simple measurements.
- Test functions are selected in accordance with the latest IEC/EN or VDE standards requirements.
- Windows compatible PC evaluation software for creating test reports. Supported transfer of test results to Excel or Word.
- All Metrel instruments equipped with AUTO SEQUENCE testing procedure are able to perform several single measurements with one automated procedure.
- The AUTO SEQUENCE feature can automatically execute all the necessary tests on the basis of predefined appliance type. Besides manual set-up, RFID and BAR code technology can also be used.
- Metrel instruments provide a PASS/FAIL indication which is displayed after every single test or the AUTO SEQUENCE test. In addition to detailed on-screen test results (displayed on LCD) this function enables further visible evaluation of the result.

AUTO SEQUENCE® ***SINGLE FUNCTION TESTS***

Why testing safety of electrical equipment?

Primary goal is to use all electrical equipment without danger. Common accidents caused by electrical equipment are:

- Injuries through electric shock caused by malfunctioned equipment
- Injuries through overheated equipment
- Fire and explosions

Most people are not aware that every (even the smallest) piece of electrical equipment can cause fatal accidents.

Many studies have proven that the cost and consequences of accidents caused by impaired electrical equipment by far exceed the investments in testing. Of course accidents cannot be excluded completely by regular testing of safety. However they can be limited to an acceptable level.

The field of electrical equipment safery is well covered by a series of published standards concerning electrical equipment design, testing instruments and procedures. Standards are important to have a unique testing system worldwide.

Testing of electrical equipment is not regulated in the same way in all countries. For instance, in Germany, UK and Australia a lot of effort was made in recen years to increase the overall electrical safety. In these countries thorough and well documented testing of all electrical equipment during its complete lifetime is regulated by law. Based on their positive experience it can be assumed that other countries will follow them in the future.

Testing safety of electrical equipment can be divided with regard to the type of electrical equipment and type of testing.

According to the standards electrical equipment is divided in:

- Electrical appliances
- Electrical machines
- Electrical switchgears

Types of safety tests of electrical equipment safety tests are:

- Type testing
- End of line testing
- Maintenance testing
- Periodic testing

International / European standards

Safety standards

General appliance testing

EN 60950 Safety of information technology equipment
EN 60335 Safety of household and similar electrical appliances
EN 61010 Safety requirements for electrical equipment for measurement, control, and laboratory
EN 60598 Safety of luminaires

Electrical machines

EN 60204 Safety of machinery - Electrical equipment of machine

Switchgears

EN 60439 Low-voltage switchgear and control gear assemblies

Test equipment feature standards

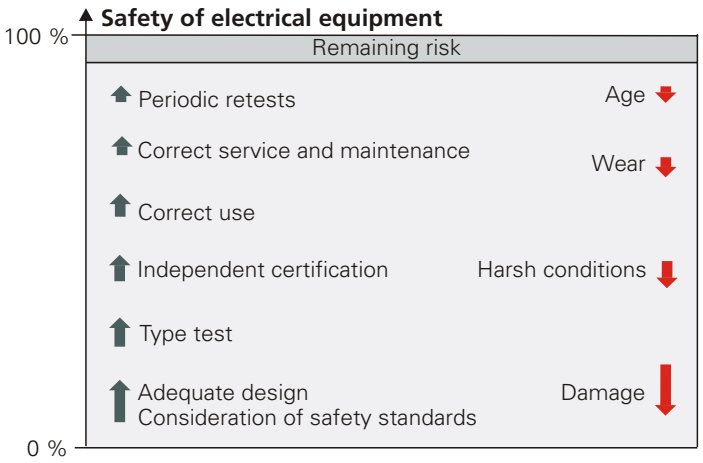
EN 61557 Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c.- Equipment for testing, measuring or monitoring of protective measures
VDE 404 Measuring equipment for testing electrical safety of electrical appliances

Safety management

The term safety management summarizes all the necessary steps that must be taken to assure the safety of electrical equipment through its complete lifetime.

These steps are:

- Quality type testing performed by the producer.
- Obtaining an independent certification mark for the product (recommended).
- Strict quality end control at producer.
- Quality maintenance of the product.
- Correct handling of the product according to product manuals and working instructions.
- Frequent visual checks by the user.
- Regular safety check performed by a skilled person (visual check, testing of safety, "Logbook" of appliance, documentation of tests, etc.).
- Adequate corrective measures in case of a noticed safety problem.



METREL INSTRUMENTS FOR ELECTRICAL APPLIANCES, MACHINES AND SWITCHBOARD SAFETY TESTING

The Metrel family of instruments for electrical appliances, machines and switchgears includes the following models:

CE Multitester - High performance, digital measuring instrument for electrical safety testing of machines, portable appliances, switchgear or other electrical devices.

MultiServicer - Digital measuring instrument for complete electrical safety testing of machines, portable appliances, switchgear and other electric devices.

OmegaPAT - Top of the range measuring instruments for electrical safety testing of portable appliances, IT equipment and IEC cords in accordance with corresponding IEC/EN and VDE standards.

BetaPAT - Top of the range measuring instrument for electrical safety testing of portable appliances, IT equipment and IEC cords in accordance with the corresponding IEC/EN and VDE standards.

AlphaPAT - High performance measuring instrument for electrical safety testing of portable appliances, IT equipment and IEC cords in accordance with the corresponding IEC/EN and VDE standards.

AlphaGT - A portable test instrument intended for all kinds of measurements performed when testing the electrical safety of portable electrical equipment. The "VDE organizer" function enables simple configuration of test procedures according to VDE701/ 702.

AutoPAT - A perfect tool for quick, routine safety testing of portable appliances, IT equipment and IEC cords.

METREL test equipment selection table

Type of testing / Type of instrument	Type testing / End of line testing (routine manufacture testing)	Maintenance and after repair testing	Periodic testing
Portable electrical appliances	CE Multitester	AlphaPAT BetaPAT, OmegaPAT AlphaGT	AlphaPAT BetaPAT, OmegaPAT AutoPAT AlphaGT
Electrical machines	CE Multitester	Multiservicer CE Multitester	Multiservicer CE Multitester
Electrical switchgears	Multiservicer CE Multitester	Multiservicer CE Multitester	Multiservicer CE Multitester

Comparison table		CE Multitester	Multiservicer	Omega&BetaPAT	AlphaGT	AlphaPAT	AutoPAT
Main features:	Part No.:	**MI 2094**	**MI 2170, MI 2171**	**MI 2140, MI 2141**	**MI 3301**	**MI 2142**	**MI 2143**
WITHSTANDING	**Withstanding Voltage Test, P_{LOAD} = 500 VA** Programmable Voltage ramp up to 5000 V AC	✓			✓		
	Withstanding Voltage Test, P_{LOAD} = 500 VA HV test up to 5000 V AC pre-set	✓			✓		
	Withstanding Voltage Test, P_{LOAD} = 250/500 VA HV test 2500 V / 1000 V AC	✓ / ✓	✓ / ✓ (- / ✓)		✓ / ✓		
	Burn-out Test 500 VA, up to 5000 V	✓			✓		
	Flash Test up to 2,5 mA, test voltage 1500 / 3000 V AC	✓ / ✓		✓ / ✓ (MI 2140 only)	✓ / ✓		
INSULATION	**Insulation Resistance Test,** test voltage: 250 V / 500 V / 1000 V DC	✓ / ✓ / ✓	- / ✓ / -		- / ✓ / -		
	Insulation Resistance Test on shuko plug, test voltage 250 V / 500 V		- / ✓	✓ / ✓	- / ✓	✓ / ✓	✓
CONTINUITY	**Continuity Test with test voltage < 12 V AC,** test current 25 A / 10 A / 200 mA / 100 mA	✓ / ✓ / ✓ / ✓	- / ✓ / ✓ / -		- / - / ✓ / -		
	Earth Bond Test < 12V Ac on shuko plug test current 25 A / 10 A / 4 A / 200 mA / 100 mA	✓ / ✓ / - / ✓ / ✓	- / ✓ / - / ✓ / -	✓ / ✓ / ✓ / ✓ / -	- / - / - / ✓ / -	✓ / ✓ / - / ✓ / ✓	✓ / - / - / - / ✓
	Voltage Drop Test with test voltage < 12 V AC test current >10 A AC calculated at 10 A	✓	✓				
	Automatic Start of Test starts at connecting test leads	✓	✓				
DISCHARGING TIME	**Discharge Time Test** - internal, external to 60 V max	✓	✓				
	Discharge Time Test - internal, external to 120 V max	✓	✓				
LEAKAGE CURRRENT	**Differential Leakage Current Test**	✓	✓	✓	✓	✓	
	Substitute Leakage Current Test		✓	✓	✓	✓	✓
	Touch Leakage Current Test		✓	✓	✓	✓	
FUNCTIONAL TEST	**Voltage**	✓			✓		
	Frequency	✓			✓		
	Current	✓	✓	✓	✓		
	Power VA	✓		✓	✓	✓	
	Power W Var, cos φ	✓			✓		
	Polarity & Fault Test			✓		✓	✓
OTHER FUNCTIONS AND OPTIONAL ACCESSORIES	**AUTOSEQUENCE**	✓		✓	✓	✓	✓
	Pass/Fail	✓	✓	✓	✓	✓	✓
	Clamp current				✓	✓	
	RS 232/USB output for PC Software	✓ / -	✓ / -	✓ / -	✓ / ✓	✓ / -	
	Direct printing on RS 232 printer			✓	✓	✓	
	Bar code scanner	✓		✓	✓	✓	
	Input / Output ports for Remote control, Warning lamps, EXT/DOOR	✓					

CE Multitester

Withstanding voltage test P_{load} = 500 VA
- Pre-set voltage in steps up to 5000 V AC.
- Pre-set voltage/time test program (t1, t2, t3; U1, U2).
- Timer from 1 s to 10 min.
- Tripping out test current from 1 mA up to 500 mA.
- Burn-out test.

Insulation resistance test
- Test voltage 250 V, 500 V and 1000 V DC.
- Measuring range up to 1 GΩ.
- Programmable limits of resistance.
- Timer from 1s to 10 min.

Leakage current
- Programmable limits from 0.1 mA to 20 mA.
- Timer from 1 s to 10 min.

Continuity test
- Test current 100 mA, 200 mA, 10 A, 25 A voltage <12 V AC.
- Resistance threshold in steps from 100 mΩ to 2 Ω.
- Timer from 1 s up to 20 s.
- Voltage drop / wire section threshold scaled to 10 A AC.

Functional tests
- Power, Apparent power, Cos φ, Voltage, Current, Frequency.

Discharge time
- External, internal.

Memory and print-out of measurement reports
- 1638 memory locations.
- PC software CE link with RS 232 communication cable.

Ordering information

Standard Set Part No. **MI 2094**

- Instrument CE MultiTester
- HV test pistol with 2 m cable, 2 pcs
- CONTINUITY test lead - 2.5 m, 2 pcs
- INSULATION test lead - 2.5 m, red
- INSULATION test lead - 2.5 m, black
- Alligator clip - black, 3 pcs
- Alligator clip - red, 2 pcs
- DISCHARGE TIME cable
- Mains cable
- Accessory bag
- Instruction manual
- Product verification data

Optional accessories

A 0941 - Remote control pedal
A 0942 - Warning lamp
A 1014 - Test tip, black
A 1016 - Test tip, red
A 1017 - RS 232 communication cable
A 1059 - ISO + CONTINUITY adapter
A 1060 - Two way mains adapter
A 1061 - Bar Code Scanner
A 1073 - PC Software CE Link with interface cable
A 1171 - USB/RS 232 converter with 1 m fixed cable
S 1057 - HV test cable 6 m with plug , set of 2 pcs
S 1058 - CONTINUITY test lead 10 m, set of 2pcs
S 1072 - CONTINUITY test lead 2.5 m, special set 2 pcs

Portable, multipurpose instrument for measurements in accordance with:

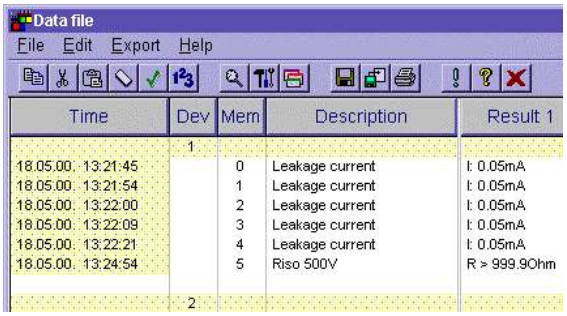
IEC 60204-1	Electrical equipment of machines
IEC 60335-1	Household and similar electrical appliances
IEC 60439-1	Switchgear and controlgear assemblies
IEC 60598-1	Luminaires
IEC 60745	Hand-held motor-operated tools
IEC 60755	Residual current operated protected devices
IEC 60950	Safety of information technology equipment
IEC 61010-1	Safety requirements for electrical equipment
IEC 61029	Transportable motor-operated tools
IEC 61558-1	Transformers and power supply units
EN 60065	Audio, video and similar electronic apparatus
VDE 701 T1	Repair and modification inspections
VDE 702 T1	Repeat tests of electrical appliances

PC Software CE Link - Powerful support tool

Analys down-loaded data

Export

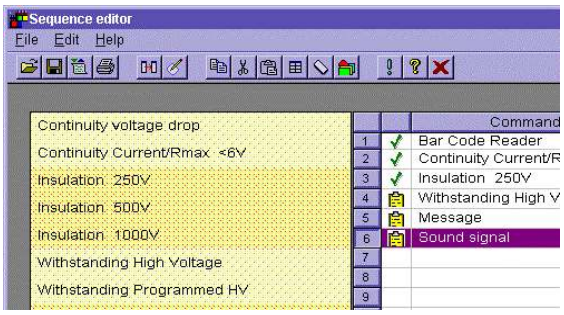
Rearrange


Data file
File Edit Export Help
Time Dev Mem Description Result 1
18.05.00. 13:21:45 0 Leakage current I: 0.05mA
18.05.00. 13:21:54 1 Leakage current I: 0.05mA
18.05.00. 13:22:00 2 Leakage current I: 0.05mA
18.05.00. 13:22:09 3 Leakage current I: 0.05mA
18.05.00. 13:22:21 4 Leakage current I: 0.05mA
18.05.00. 13:24:54 5 Riso 500V R > 999.9Ohm

Creating measurement sequences (autotest)

List of autoprograms

Edit parameters



Create documentation

New/edit device test

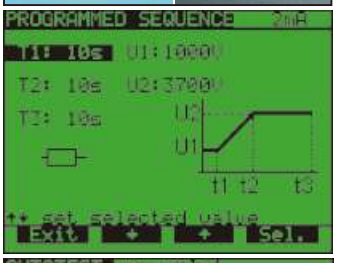
Insert/edit device test

Measured in power plant No 2
24.08.00
CE Multitester / MI2094 / FW: 28 / 00052601

Mem	Description	Result 1	Result 2
1	Riso 500 V	RL: 1.0 MOhm	R: 24.64 MOhm
2	Riso 500 V	RL: 1.0 MOhm	R: 3.019 MOhm3
3			
4			
5			

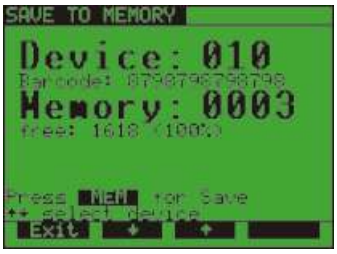
Key features

Inputs/outputs for manual or automatic settings



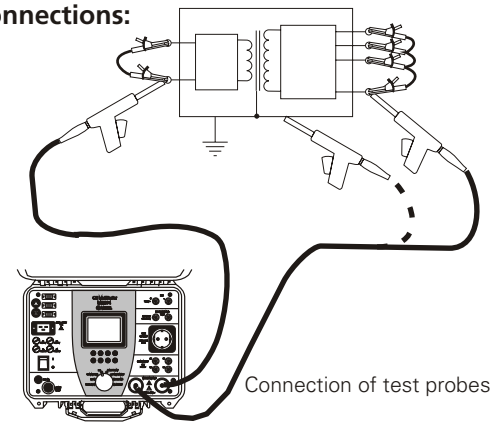
Wide range of simple menus for programming

On-line information about pre-programmed testing procedures

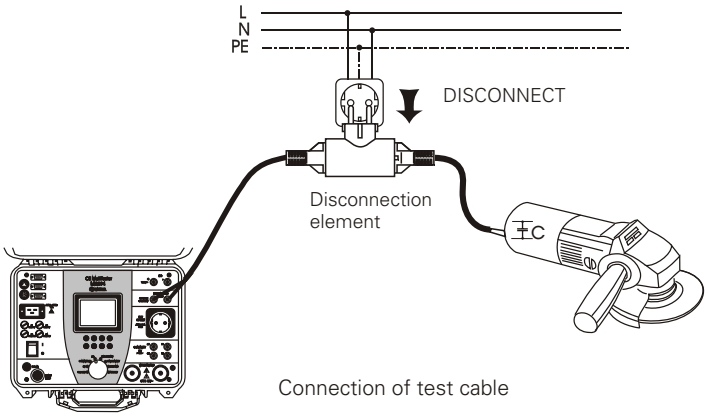


Memorizing particular testing results

Typical connections:



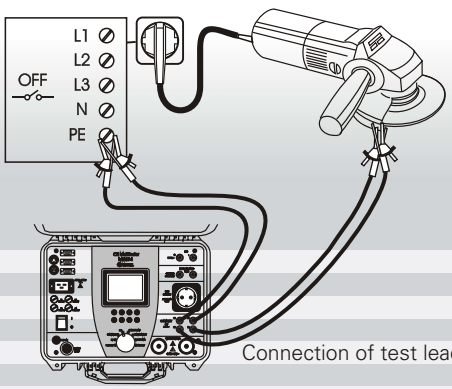
Connection of test probes



Connection of test cable

Technical specifications

Withstanding test 500 VA:		100 V ÷ 1000 V AC ±(2 % + 5 dig.)		
Trip-out current settable limit 0.1 ÷ 500 mA		1000 V ÷ 5000 V AC ±(3 % + 5 dig.)		
Insulation resistance test:		0 ÷ 1.999 MΩ ±(3 % + 3 dig.)		
Test voltage: 250 V, 500 V, 1000 V DC		2 ÷ 19.99 MΩ ±(3 % + 3 dig.)		
Current 1 mA min.		20 ÷ 199.9 MΩ ±(3 % + 3 dig.)		
Programmable resistance limits		200 ÷ 1 GΩ ±(5 % + 3 dig.)		
Continuity test	Test current 10 A, 25 A	0 ÷ 1 Ω ±(3 % + 3 dig.) 1 ÷ 2 Ω ±(3 % + 3 dig.)		
Test voltage <12 V AC	100 mA	0 ÷ 9.99 Ω ±(5 % + 12 dig.)		
Programmable resistance limits	200 mA	0 ÷ 9.99 Ω ±(5 % + 6 dig.)		
Voltage drop test 10 A	100 mA, 200 mA	10 ÷ 100 Ω ±(5 % + 6 dig.)		
Discharge time test (internal, external): Programmable limits		0 ÷ 10 s ±2 %		
Timer for tests as above		1 s ÷ 10 min		
Leakage current test Programmable limits		0 ÷ 4 mA, 4 ÷ 20 mA ±(5 % +3 dig.)		
Power, Apparent Power	Voltage	Current	Cos φ	Frequency
1 ÷ 200 VA ±(5 % +10 dig.) 200 ÷ 3500 VA ±(5 % +3 dig.)	0 ÷ 400 V ±(2% +2 dig.)	0 ÷ 1 A ±(3 % +3 dig.) 1 ÷ 16 A ±(5 % +5 dig.)	0 ÷ 1 ±(3 % +3 dig.)	45 ÷ 65 Hz ±(0,1 % +3 dig.)



Connection of test leads

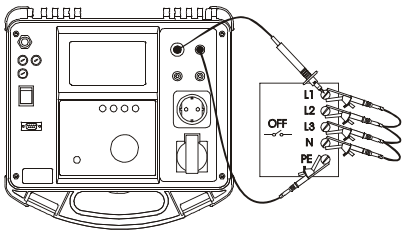
General

Display:	160 × 160 dot graphic matrix display with backlight
Case:	portable
Power Supply:	230 V (45–65 Hz)
Overvoltage category:	Cat III/300 V, Cat II/600 V
Pollution degree:	2
Degree of protection:	IP 50
Protection classification:	I
Dimensions (w x h x d):	410 × 175 × 370 mm
Weight (without accessories):	13.5 kg

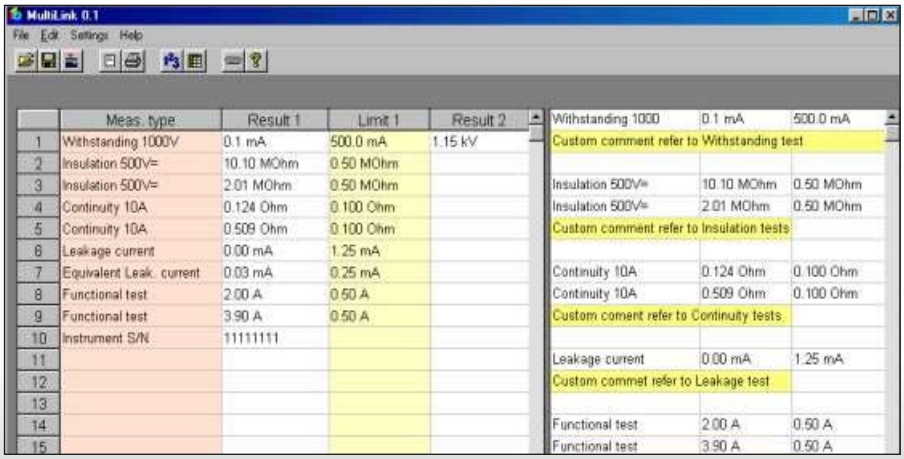
MultiServicer

- **Digital measuring instrument for complete electrical safety testing of machines, portable appliances, switchgear and other electric devices.**
- **Robust, low weight design and ease of use represents MultiServicer an ideal solution for testing of electrical safety in different industrial environments, workshops or R&D laboratories.**
- Test functions comprise: high-voltage AC dielectric test with test voltages 2500 V and 1000 V with selectable leakage current trip out level, DC insulation resistance measurement, PE continuity test, 10 A earth bond test, discharging time measurement, leakage current measurement and functional test.
- MultiServicer supports measurements of fixedly installed electrical loads or one-phase, smaller loads that use shuko plug connection.
- Version MI 2171 is designed particularly for machine testing.

Typical connections:



Withstanding test 2500 V -
Connection of test leads


MultiLink 0.1
File Edit Settings Help
Meas. type | Result 1 | Limit 1 | Result 2
1 Withstanding 1000V | 0.1 mA | 500.0 mA | 1.15 kV
2 Insulation 500V= | 10.10 MOhm | 0.50 MOhm
3 Insulation 500V= | 2.01 MOhm | 0.50 MOhm
4 Continuity 10A | 0.124 Ohm | 0.100 Ohm
5 Continuity 10A | 0.509 Ohm | 0.100 Ohm
6 Leakage current | 0.00 mA | 1.25 mA
7 Equivalent Leak. current | 0.03 mA | 0.25 mA
8 Functional test | 2.00 A | 0.50 A
9 Functional test | 3.90 A | 0.50 A
10 Instrument S/N | 11111111
Withstanding 1000 | 0.1 mA | 500.0 mA
Custom comment refer to Withstanding test
Insulation 500V= | 10.10 MOhm | 0.50 MOhm
Insulation 500V= | 2.01 MOhm | 0.50 MOhm
Custom comment refer to Insulation tests
Continuity 10A | 0.124 Ohm | 0.100 Ohm
Continuity 10A | 0.509 Ohm | 0.100 Ohm
Custom coment refer to Continuity tests
Leakage current | 0.00 mA | 1.25 mA
Custom commet refer to Leakage test
Functional test | 2.00 A | 0.50 A
Functional test | 3.90 A | 0.50 A

MultiLink PC Software

Measurements in accordance with:

IEC 60204	Electrical equipment of machines
IEC 60439-1	Switchgear and controlgear assemblies
IEC 60755	Residual current operated protected devices
IEC 60598-1	Luminaires
VDE 701 T1	Repair and modification inspections
VDE 702 T1	Repeat tests of electrical appliances
IEC 50144-1	Safety of hand-held electric motor operated tools

Ordering information

Standard Set Part No. **MI 2170, MI 2171**

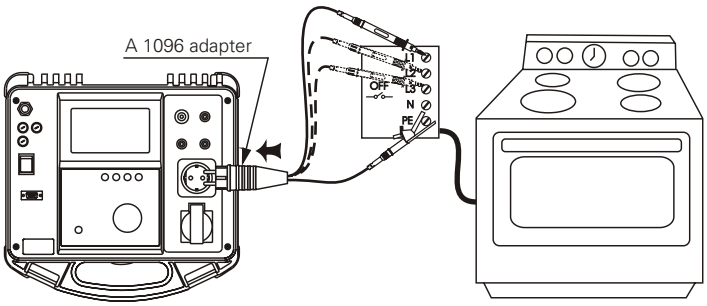
- Instrument MultiServicer MI 2170 or MI 2171
- HV test lead
- Test lead - black, 2 m
- Test lead - red, 2 m
- Test tip, black
- Test tip, red
- Alligator clip, black
- Alligator clip, red
- Windows Software with RS 232 interface cable
- Protective bag for accessories
- Instruction manual
- Product verification data

Optional accessories

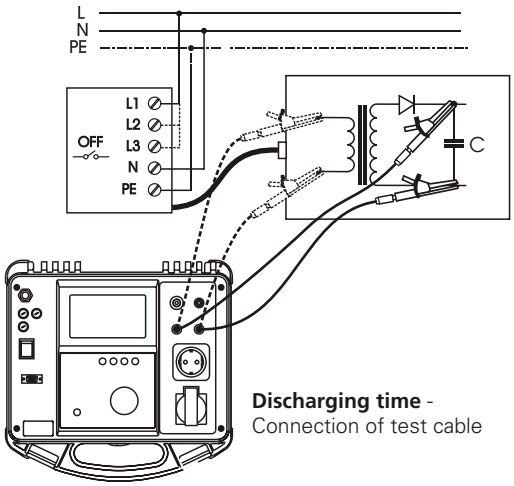
A 1095 - INS / SUB adapter
A 1096 - Adapter for hard connection
A 1171 - USB/RS 232 converter with 1 m fixed cable
S 2012 - Continuity extension,10 m, set of 2 pcs

Complete testing of safety on machines (initial installation or periodic basic).

Testing of construction site safety on a switchgear.



Touch Leakage current - Connection of hard-wired equipment



Discharging time - Connection of test cable

Technical specifications

Function	Measuring range	Accuracy	MI 2170	MI 2171
Withstanding voltage test 2500 V AC / 250 VA Trip-out current / time	0 - 3000 V 2, 5, 10, 50, 100 mA / <30 ms	± (5% + 5 dig.)	✔	
Withstanding voltage test 1000 V AC / 500 VA Trip-out current / time	0 - 1500 V 5, 10, 20, 50, 100, 500 mA / <30 ms	± (5 % + 5 dig.)	✔	✔
Insulation resistance test 500 V DC (Hi and Lo terminal) Test current Primary field of use: testing of machines, switchgears	0 - 19.99 MΩ min. 1 mA at 500 kΩ	± (5 % + 5 dig.)	✔	✔
Voltage drop test / **Continuity test 10 A (*)** (Hi and Lo terminal) Test current Primary field of use: testing of machines	0 - 11.99 V 0 - 1.999 Ω >10 A at R <330 mΩ	± (5 % + 5 dig.) ± (5 % + 5 dig.)	✔	✔
Discharge time test 60 V, 120 V (Hi and Lo terminal) Input resistance	0 - 9.9 s 48 MΩ	± (5 % + 3 dig.)	✔	✔
Voltage measurement	0 - 450 V TRMS	± (2 % + 3 dig.)	✔	✔
Functional test	0 - 15.99 A	± (5 % + 3 dig.)		
Continuity test 10 A (*) (on shuko plug) Test current Primary field of use: testing of appliances	0 - 1.999 Ω >10 A at R <330 mΩ		✔	
Continuity test 200 mA Test current	0 - 19.99 Ω >200 mA	± (5 % + 5 dig.)	✔	
Insulation resistance test 500 V DC (on shuko plug) Test current Primary field of use: testing of appliances	0 - 19.99 MΩ min. 1 mA at 500 kΩ	± (5 % + 5 dig.)	✔	
Substitute Leakage Open circuit voltage	0 - 19.99 mA 40 V	± (5 % + 5 dig.)	✔	
Touch Leakage Current Probe resistance	0 - 1.99 mA 1.8 kΩ	± (5 % + 5 dig.)	✔	
Differential Leakage Current	0 - 19.99 mA	± (5 % + 5 dig.)	✔	✔
(*)Automatic test				

Final test on a portable appliance in a service workshop.

General	
Power Supply:	230 V AC (optional 110 V)
Memories:	50 locations
Degree of protection (closed case):	IP 54
Overvoltage category:	Cat III/300 V
Polultion degree:	2
Protection classification:	I
Compensation of test leads:	yes
Case:	portable
Dimensions (w x h x d:)	345 × 160 × 335 mm
Weight (without accessories):	9.5 kg

OmegaPAT, BetaPAT

The most advanced Portable Appliance Testers

Wide application range

- Enables complete safety verification of a wide range of electrical appliances of **Class I**, **Class II** and **Class III** appliances.
- Ideally suited for periodical testing, electrical service interventions, and control testing of appliances.
- Supports 230 V and 110 V.

Autotest mode for easier and faster testing

- It offers a list of preprogrammed autotest sequences and the possibility to customize your own test procedure.
- Over **4000 Autotests** can be stored into the memory.
- Supports **RFID** and **Barcode labels** for fast auto-testing.

High accuracy and safety

- The instrument meets or exceeds the demands of the latest safety and appliance testing standards.
- High accuracy, the highest protection of the user and tested appliance during test is guaranteed in all working conditions.

Easy operation

- High resolution **large graphic display** contains all important information when working with the tester.
- Customized **keypad with jogger** for fast access to all of the functions.
- All tests can be performed without external adapters.
- Fast direct print-out facilities for immediate printing.

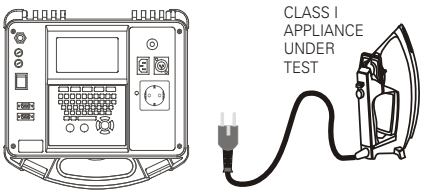
PC Software package PAT Link

- Perfect tool for documentation, analysis and printing out test reports.

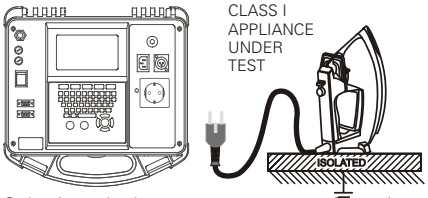
Robust, waterproof case

- The new Metrel case offers **high protection** even if working in hazarduous conditions.
- All standard **accessories can be stored** in the case.

Typical connections:



Insulation test on Class I appliance



Substitute leakage current test on Class I appliance.

Ordering information

Standard Set Part No. **MI 2140, MI 2141**

- Instrument OmegaPAT-MI 2140 or BetaPAT MI 2141
- Earth Bond Clip
- Flash Test Probe (only for MI 2140)
- PC SW Pat Link with RS 232 cable
- Instruction manual
- Product verification data

Measurements and testing in accordance with:

IEC 60335-1	Household and similar elec
IEC 60598-1	Luminaires
IEC 60745	Hand-held motor operated tools
IEC 60950	Safety of information technology equipment
VDE 701 T1	Repair and modification inspections
VDE 702 T1	Repeat tests of electrical appliances

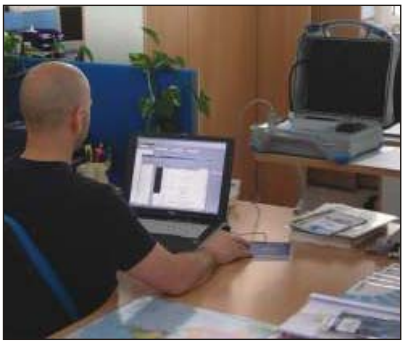
The complete analysis of safety:	**Omega PAT**	**Beta PAT**
Visual test	✓	✓
Earth Bond Test	✓	✓
Insulation	✓	✓
Sub Leakage Current	✓	✓
Touch Leakage Current	✓	✓
Differential Leakage Current	✓	✓
Flash Test	✓	
Power Test	✓	✓
Polarity (cord) Test	✓	✓

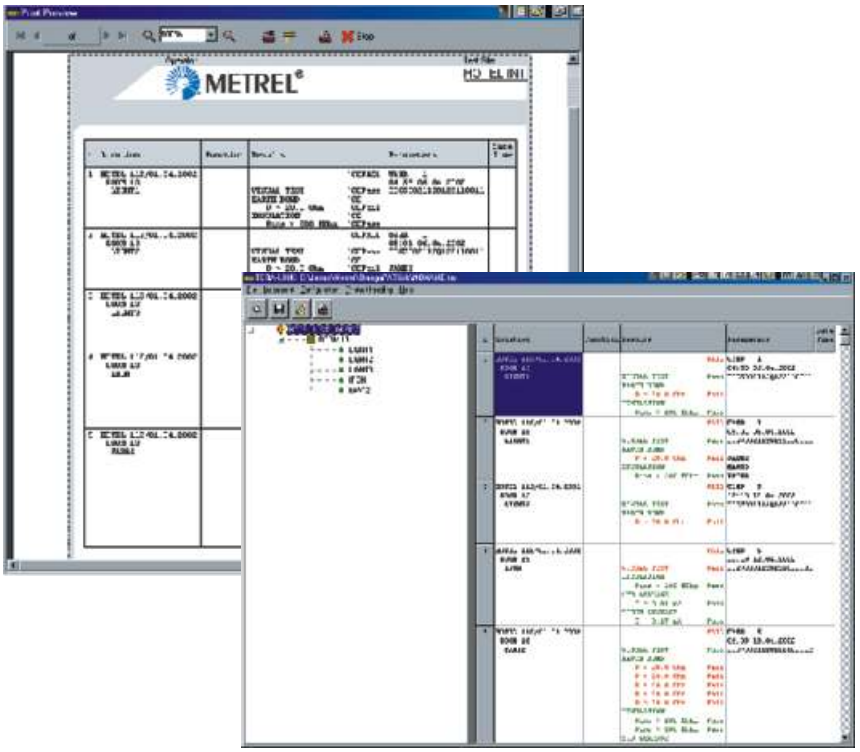
Optional accessories

A 1103 - Printer
A 1226 - RS 232 cable 9/25 pin for printer
A 1104 - 110 / 230 V adapter
A 1105 - Bar code scanner
A 1106 - Bar code labels, roll of 1000 pcs
A 1171 - USB/RS 232 converter with 1 m fixed cable

Professional PC SW package, printout facilities

The accompanying professional PC SW package PATLink enables:
- viewing and analysing measurement results,
- storing results for documentation,
- operating test reports,
- printing test reports.





Fast print-outs of measurement results.

Bar code labels for tested appliance identification.

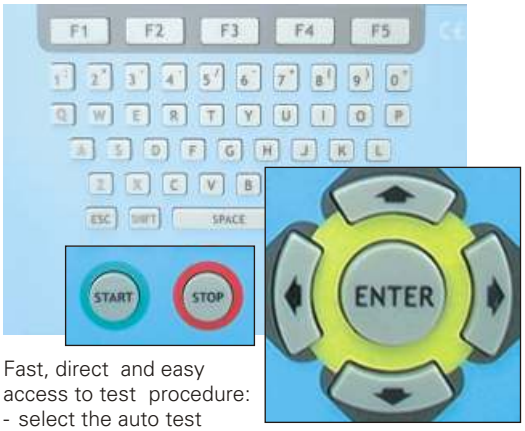
Key Features

Selection of the appliance type.

Pre-programmed auto test sequences.

EARTH BOND
If the test fails:
- Make sure that you have connected
- All leads and that the earth connection is sound, i.e. not
painted or coated.

Help menus for individual tests.



Fast, direct and easy access to test procedure:
- select the auto test
- press START

Multiple - input / output ports:
- Bar code reader
- RFID reader / printer
- Printer
- PC

Technical Specification

Function		Accuracy
Earth Bond		
Test currents:	100 mA, 4 A, 10 A, 25 A	
Measuring range:	0.00 ÷ 19.9 Ω	±(5 % + 5 dig.)
Insulation		
Test voltage:	250 V, 500 V	
Measuring range:	0.000 ÷ 199.9 M Ω	±(5 % + 5 dig.)
Substitute Leakage		
Test voltage:	40 V	
Measuring range:	0.00 ÷ 1.99 mA	±(5 % + 5 dig.)
Touch Leakage		
Measuring range:	0.00 ÷ 19.99 mA	±(5 % + 5 dig.)
Leakage		
Measuring range:	0.00 ÷ 19.99 mA	±(5 % + 5 dig.)
Power		
Measuring range:	0 ÷ 4 kVA	±(5 % + 5 dig.)
Flash Test		
Output voltage:	1500 V / 3000 V	
Measuring range:	0.00 ÷ 2.50 mA	±(5 % + 5 dig.)
Trip-out function:	yes	
Polarity		
Output voltage:	40 V	
Faults: Open, Short, Crossed, Multiple fault		
Timer: All functions, 2 s ÷ 180 s		
Limits: All functions, programmable		

General		
Mains voltage –230 V system:	230 V (+6 % - 10 %) / 50 or 60 Hz	
Mains voltage –115V system:	115 V (+6 % - 10 %) / 50 or 60 Hz	
Max. power consumption:	150 VA (without load on TEST SOCKETS)	
Display:	Graphic, 240 X 128 dots	
RS232 interfaces:	Baud rate 115200	
Memories:	4000 memory locations	
Shock proof plastic / portable case:		
Dimensions (w x h x d):	335 x 160 x 335 mm	
Mass (without accessories):	9 kg	
Pollution degree:	2	
Degree of protection (closed):	IP 54	
Overvoltage category:	Cat II / 300 V	
Protection classification:	I	
Working temperature range:	- 10 to + 50°C	
Protection against overload on test sockets:		yes
Protection against shorted appliances or excesive leakages:		yes
Earthing connection detection:		yes

AlphaPAT Portable Appliance Tester

Wide application range

- AlphaPAT is a handheld instrument intended for safety testing on electrical portable appliances, information technology equipment and IEC cords.

Easy operation

- Jogger keypad combined with user friendly graphic LCD simplifies adjusting and measuring procedure.

Autotest sequence mode offers

- **Shortcut Menu** with over 120 types of pre-selected test procedures based on appliance type, class, length of supply cord, maximum current capacity, and other.
- **Custom Menu** which enables user pre-programmed tests and test sequences.

Dual voltage test capability

High accuracy and safety

- The instrument meets or exceeds the demands of the latest safety and appliance testing standards.
- High accuracy and the highest protection of the user and tested appliance during test is guaranteed in all working conditions.

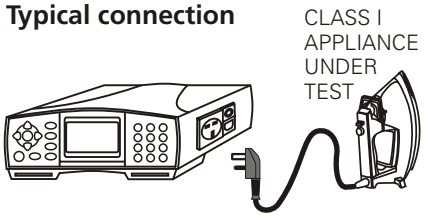
Lightweight design

- AlphaPAT is assembled in a durable, rugged housing, weighting under 3.5 kg.

PC Software PAT Link

- Perfect tool for documentation, analysis and printing out test reports.

Typical connection



Measurement of insulation resistance of class I appliance

Ordering information

Standard Set Part No. **MI 2142**

- Instrument-AlphaPAT
- Earth Bond/Touch Leakage clip
- Mains cable
- Carrying bag
- Instruction manual
- Produc verification data

Optional accessories

A 1018 - Measurement clamp (low range, leakage)
A 1103 - Printer
A 1226 - RS 232 cable 9/25 pin for printer
A 1105 - Bar code scanner
A 1106 - Bar code labels, roll of 1000 pcs
A 1107 - RFID reader / writer
A 1108 - RFID tags, 50 pcs
A 1117 - PC SW PATLink with RS 232 cable
A 1136 - 110 V Adapter
A 1171 - USB/RS 232 converter with 1m fixed cable

Features

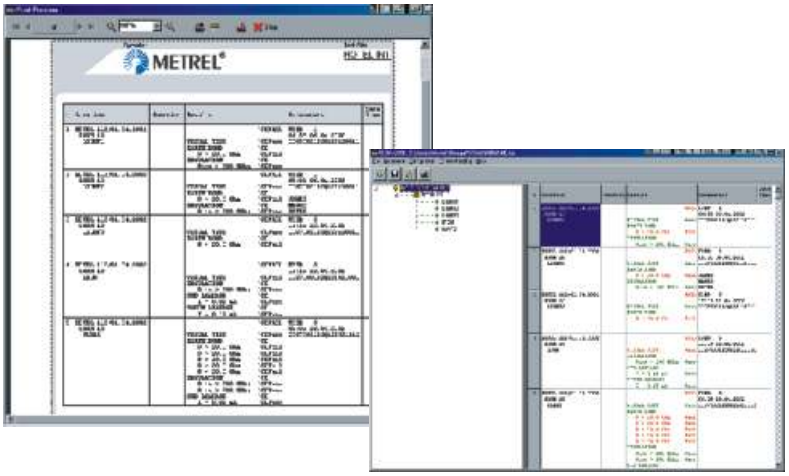
Single tests or Autotest sequence tests
(All measurements areTrue RMS):
- Earth Bond Test
- Screen Bond Test
- Insulation Resistance
- Substitute Leakage Current
- Differential Leakage Test
- Touch Leakage Test
- Functional Test
- IEC Lead Test
- Clamp Current Test
- Polarity Test
Unique Shortcut Menu
- Communication with PC, BAR Code Reader
- RFID Reader / Writer,or Printer
4 Mbit Data Flash Memory
Downloads at 115,000 k baud rate

Measurements and testing in accordance with:

IEC 60335-1	Household and similar electrical appliances
IEC 60598-1	Luminaires
IEC 60745	Hand-held motor operated tools
IEC 60950	Safety of information technology equipment
VDE 701 T1	Repair and modification inspections
VDE 702 T1	Repeat tests of electrical appliances
VDE 0751 T1	Repair modification and testing of medical equipment

Professional PC SW package, printout facilities

The accompanying professional PC SW package PATLink enables:
- viewing and analysing measurement results,
- storing results for documentation,
- operating test reports,
- printing test reports.



Latest technology for appliance identification-RFID technology
- stores test appliance type procedure, test date, test results, comments in small RFID tags,
- simple RFID reader / writer

Fast print-outs of measurement results.

Bar Code technology

Bar code labels for tested appliance identification.

Technical Specification

Function		Accuracy
Earth bond test		
Test currents:	10 A, 25 A	
Measuring range:	0.00 ÷ 19.99 Ω	±(5 % of reading + 3 dig.)
Earth bond test		
Test current:	100 mA	
Measuring range:	0.00 ÷ 19.99 Ω	±(5 % of reading + 3 dig.)
Insulation test		
Test voltages:	250 V DC, 500 V DC	
Measuring range:	0.00 ÷ 0.500 MΩ	±(10 % of reading + 3 dig.)
	0.501 ÷ 19.99 MΩ	±(5 % of reading + 3 dig.)
Substitute leakage test		
Test voltage:	40 V AC	
Measuring range:	0.00 ÷ 19.99 mA	±(5 % of reading + 5 dig.)
Differential leakage test		
Measuring range:	0.00 ÷ 19.99 mA	±(5 % of reading + 5 dig.)
Touch leakage test		
Measuring range:	0.00 ÷ 1.99 mA	±(5 % of reading + 5 dig.)
Functional test		
Power measuring range:	0.00 ÷ 3.69 kVA	±(10 % of reading + 3 dig.)
IEC lead test		
Test voltage:	<50 V AC	
Faults:	Open, Short, Crossed, Multiple faults	
Clamp current (True RMS)		
Current range:	0.00 mA ÷ 24.9 A	±(5 % of reading + 5 dig.)
L-N pretest		
Tests between L and N. Pass level is 30 kΩ ±6 kΩ.		

Key Features

- Over 120 pre-selected Autotest procedures
- Customised Autotests
- Single tests
- Storing, downloading and direct printing of test results.

- Simple access to pre-programmed Autotests.

- Adjustable limits and user friendly graphic LCD accelerate the measuring procedure.

Clear and easy access to test procedure:
- select the auto test, press START.

Mobile phone type keypad for fast entery of appliance data and date.

Connection for Earth leakage current clamp.

Multi - input / output ports:
- Bar Code reader
- RFID reader / writer
- Printer
- PC

Carrying bag for easier field work.

Connector panel:
- Test socket (different versions available)
- IEC lead connector
- Earth bond connector

General	
Mains voltage :	230 V AC (+10 %, -10 %), 50 / 60 Hz
Display:	Graphic 128 x 64 dots matrix display, backlight
RS232 interface:	Baud rate max. 115,200 bps
Memory:	4 Mbit data flash memory
Pollution degree:	2
Degree of protection:	IP 41
Overvoltage category:	CAT II / 300 V
Protection classification:	double insulation
Dimensions (w x h x d):	265 x 110 x 185 mm
Weight (without accessories):	3.5 kg
Working temperature range:	0 ÷ +40 °C

AlphaGT

AlphaGT MI 3301 is a portable test instrument intended for all measurements performed when testing the electrical safety of portable electrical equipment.

Highlights:

- The "VDE organizer" function enables simple configuration of test procedures which are 100% compatible with VDE701/ 702 regulative. All measurements conform to the demands of the VDE 404 standard.
- A graphic LCD display with backlight offers easy to read results, indications, measurement parameters, and messages. Operation is simple and intuitive and the operator does not need any special training (except reading this user manual) to work with the instrument.
- Built-in flash memory for storing test results is an important feature of the GT 701/702 instrument. Professional PC software package PATLink enables simple transfer of test results and other measurement parameters in both directions between the test instrument and PC. Two RS 232 communication ports also allow communication with a barcode reader, printer, and RFID reader/writer.
- 3-phase adapters are available as optional accessories for testing 3-phase appliances.

Ordering information

Standard Set Part No. **MI 3301**

- Instrument AlphaGT
- Carrying bag
- Test cable 2 m, red
- Aligator clip, red
- PC SW PATLink with RS 232 cable
- USB Cable
- Instruction manual
- Product verification data

Optional accessories

A 1018 - Measurement clamp (low range, leakage)
A 1103 - Printer
A 1235 - RS 232 cable 9/25 pin for printer
A 1105 - Bar code Scanner
A 1107 - RFID reader/writer
A 1108 - RFID tags, 50 pcs
A 1203 - PC SW PatLink PRO
A 1204 - Bar code labels for appliance ID
A 1205 - Bar code labels for test sequence code
A 1206 - Custom bar code labels
A 1207 - 3-phase adapter

Features

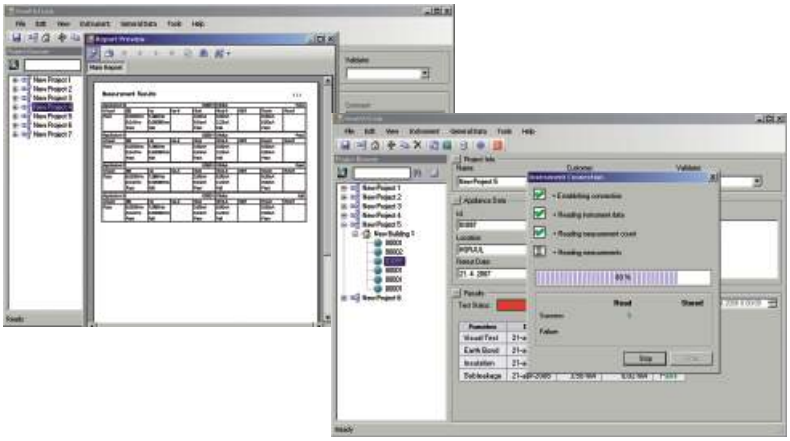
Singe tests and Autotest sequence according to VDE 701/702 (measuring range according to VDE 0404):
- Earth bond resistance
- Insulation resistance
- Substitute leakage current
- Differential leakage current for both mains polarities
- Touch leakage current
- Functional test
- TRMS current measurement with current clamp adaptor

Measurements and testing in accordance with:

EN61010-1	Safety
IEC 61326	Electromagnetic compatibility (emission and immunity)
VDE 0701-1	Measurements (procedures, tests)
VDE 0702-1	Measurements (procedures, tests)
VDE 0404-1, 2	Measurements (procedures, tests)

Professional PC SW package, printout facilities

The accompanying professional PC SW package PATLink enables:
- viewing and analysing measurement results,
- storing results for documentation,
- operating test reports,
- printing test reports.



Latest technology for appliance identification-RFID technology
- stores test appliance type procedure, test date, test results, comments in small RFID tags,
- simple RFID reader / writer.

Fast print-outs of measurement results.

Bar Code technology

Bar code labels for tested appliance identification.

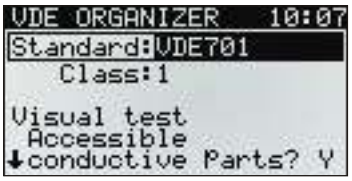
Technical Specification

Function		Accuracy
Earth bond resistance		
Test current:	200 mA	
Open circuit voltage:	<12 V AC	
Measuring range:	0.00 ÷ 9.99 Ω	±(3 % of reading + 3 dig.)
	10.0 ÷ 19.9 Ω	±(3 % of reading + 3 dig.)
Insulation resistance, insulation resistance - probe		
Nominal voltage:	500 V DC	
Auto discharge after test		
Short circuit current:	<2 mA	
Measuring current:	min. 1 mA at 500 kΩ	
Measuring range:	0.000 ÷ 0.500 MΩ	±(10 % of reading + 5 dig.)
	0.501 ÷ 1.999 MΩ	±(5 % of reading + 3 dig.)
	2.00 ÷ 19.99 MΩ	±(5 % of reading + 3 dig.)
	20.0 ÷ 199.9 MΩ	±(10 % of reading)
Substitute leakage current, substitute leakage current - probe		
Open circuit voltage:	<50 V AC	
Measuring range:	0.00 ÷ 19.99 mA	±(3 % of reading + 3 dig.)
	20.0 ÷ 29.9 mA	±(5 % of reading)
Differential leakage current		
Measuring range:	0.00 ÷ 19.99 mA	±(4 % of reading + 4 dig.)
Touch leakage current		
Measuring range:	0.00 ÷ 1.99 mA	±(4 % of reading + 2 dig.)
Functional test		
Power measuring range:	0.00 ÷ 3.7 kVA	±(10 % of reading + 3 dig.)
Clamp current (True RMS)		
Current range:	0.00 mA ÷ 24.9 A	±(5 % of reading + 5 dig.)*

*Accuracy of current clamp must be considered.

Key Features

Measurements can be executed from different menus (VDE organizer, Autotest, Barcode-TAG, Single test).



Commonly used test sequences can be configured and stored in the VDE ORGANIZER menu.

Example of touch leakage current result screen. The actual result is shown on the display during measurement. The highest current is considered as the test result together with PASS/FAIL indication.

Clear and easy access to test procedure

Mobile phone type keypad for fast entery of appliance data and date.

Connection for Earth leakage current clamp.

Multi - input / output ports:
- Bar Code reader
- RFID reader / writer
- Printer
- PC
- USB

Carrying bag for easier field work.

Connector panel

General	
Rated supply voltage:	230 V AC (±10 %, 50 or 60 Hz)
Max. power consumption:	< 10 VA (without tested appliance)
Maximum appliance current:	16 A
Overvoltage category:	Cat II / 300 V
Protection classification:	I
Pollution degree:	2
Display:	64 × 128 dot graphic matrix display with backlight
Dimensions (w × h× d):	265 × 110 × 185 mm
Weight (without accessories):	3.5 kg
Memory:	1100 memory locations
RS 232 interfaces:	1200 bps ÷ 115200 bps
USB interface:	115200 bps
Working temperature range:	0 °C ÷ 40 °C
Maximum relative humidity:	95 % RH (0 °C ÷ 40 °C), non-condensing

AutoPAT Simple PASS / FAIL field Portable Appliance Tester

Wide application range

- AutoPAT is a portable appliance tester with factory pre-set limit values that allow safety testing on Class I and Class II portable appliances, IT equipment and IEC cords.

Fast measurements

- Complete measuring procedure is accomplished in less than 15 seconds.

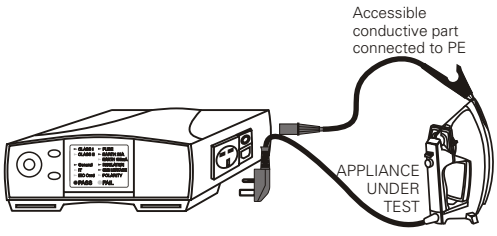
PASS/FAIL presentation of results

- Measuring results for both, individual measuring parameters and the overall results are clearly displayed in a PASS/FAIL form.

Versatility

- AutoPAT supports measurements on 110 V and 230 V appliances.

Typical Connection



Connection of the CLASS I appliance

Ordering information

Standard Set Part No. **MI 2143**

- Instrument AutoPAT
- Earth Bond/Touch Leakage clip
- Mains cable
- Carrying bag
- Instruction manual
- Product verification data

Optional accessories

A 1136 - 110 V Adapter

Technical specifications

Earth 25 A		
Limits:	0.1 Ω, 0.5 Ω	Accuracy ±10 %
Earth 100 mA		
Limits:	0.1 Ω, 0.5 Ω	Accuracy ±10 %
Insulation resistance		
Limits:	1 MΩ, 2 MΩ	Accuracy ±10 %
Substitute leakage current		
Limits:	0.75 mA, 3.5 mA	Accuracy ±10 %
Polarity test		
Test voltage:	< 80 V DC/1 mA	
Fuse pretest		
Limits:	30 kΩ	

General	
Rated supply voltage:	210 V ÷ 264 V, 50 Hz or 60 Hz
Overvoltage category:	300 V CAT II
Protection classification	II (double insulation)
Pollution degree:	2
Display:	LED indicators
Dimensions (w x h x d):	265 × 110 × 185 mm
Weight (with standard accessories):	2.8 kg
Storage temperature range:	-10 °C ÷ + 70 °C
Operation temperature range:	0 °C ÷ + 40 °C
Maximum relative humidity:	80 % RH (0 °C ÷ + 40 °C)
Measurements and testing in accordance with:	
BS 89:	Recommended test methods
EN 60950:	Safety of information technology equipment
VDE 701:	Repair and modification inspections
VDE 702:	Repeat tests of electrical appliances

PAT Demoboard

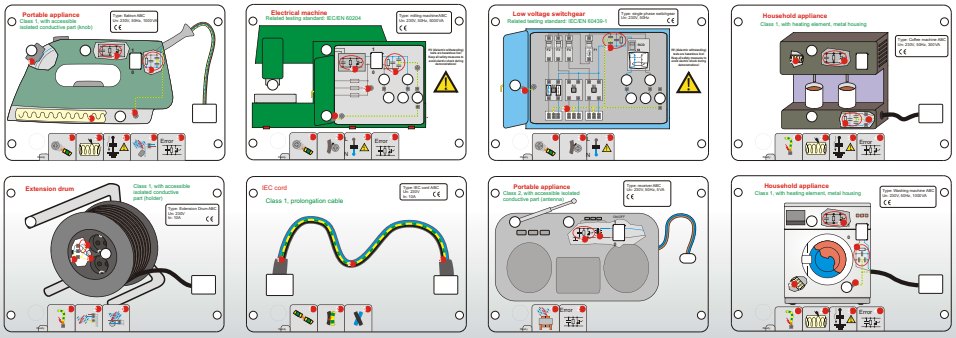
PAT Demoboard is intended for demonstration of electrical equipment safety management. Typical applications are:

- Presentation of safety management of electrical equipment in seminars, courses.
- Presentation of typical safety problems on electrical equipment.
- Practical demonstration of measuring instruments (performing tests, making right connections, analysing measured results).

Different values of electrical parameters that are usually checked during an electrical equipment safety test can be simulated. Error states can be switched On or Off. The following electrical parameters can be simulated:

- Continuity of equipotential bonding
- Insulation resistance
- Leakage current
- Touch leakage current
- Polarity of cables
- Functional operation

A practically unlimited number of different pieces of equipment (portable and handheld appliances, machines, switchgears) can be simulated by using different demonstration tables.
Eight tables are included in the standard set.
On demand the PAT Demoboard can be simply upgraded with new demonstration tables (special applications, country design, etc.).



Technical specifications

Protection classification (except simulation area):	Class I
Nominal input voltage:	230 V (+6 %, -10 %)
Optional on request:	115 V (+6 %, -10 %)
Power consumption:	15 VA max.
Overvoltage category:	CAT II 300 V
Frequency range:	45 Hz to 66 Hz
Pollution degree:	2
Dimensions (w × h × d):	350 x 335 x 160 mm
Mass (without accessories):	7 kg
Working temperature range:	10 °C 36 °C
Storage temperature range:	-20 °C +50 C
Maximum humidity:	95 % RH (10 °C 36 °C) non-condensing

Ordering information

Standard Set Part No. **MI 3300**

- Instrument PAT Demoboard
- 8 demonstration tables (iron, receiver, IEC cord, extension drum, coffee machine, washing machine, switchgear)
- Handbook "Electrical Equipment Testing" on CD
- Jumper for shorting L and N connections
- Prolongation cord for demonstration of testing IEC prolongation cords
- Mains cable
- Class I mains cable for connecting PAT testers to PAT Demoboard
- Class II mains cable for connecting PAT testers to PAT Demoboard
- Measuring cable for testing discharging time
- Carrying bag for demonstration tables
- User Manual
- Product verification data

Short Glossary

Portable Appliance Testing (PAT): A process by which electrical appliances are routinely checked to see if they are safe. Testing should be carried out at regular intervals to ensure continual safety; the interval between tests depends on both the type of appliance and the environment it is used in.

Portable Appliance Equipment: There are many European standards and guidance notes regarding portable appliances and equipment, though they do not establish a common and specific definition of such equipment.

Portable appliance: An appliance of less than 18 kg in mass that is intended to be moved whilst in operation or an appliance which can easily be moved from one place to another.

Movable equipment (transportable): This equipment is either 18 kg or less in mass and not fixed or equipment with wheels, castors or other means to facilitate movement by the operator as required to perform its intended use.

Hand Held equipment or appliances: This is portable equipment intended to be held by hand during normal use.

Stationary equipment or appliances: Equipment has a mass exceeding 18 kg and is not provided with a carrying handle.

Fixed Equipment/appliances: This equipment or an appliance which is fastened to a support or otherwise secured in a specific location.

Appliances/equipment for building: This equipment is intended to be installed in a prepared recess such as a cupboard or similar. In general, equipment for in-building in does not have exposure on all sides because on one or more sides, additional protection against electrical shock is provided by the surroundings.

Information technology equipment: Information technology equipment includes electrical business equipment, such as computers and mains powered telecommunications equipment, and other equipment for general business use, e.g. mail processing machines, VDU's photo-copiers, etc.

Switchboard: An assembly containing switches or protective devices e.g. fuses, circuit-breakers, residual current operated devices.

Machine: Any mechanical or electrical device that transmits or modifies energy to perform or assist in the performance of human tasks.

Class 1: (Earthed Appliances) are protected against electric shock by means of a protective earth conductor being connected between the supply plug and the conductive metal parts of the equipment. This is in addition to basic insulation. The supply cable carries 3 wires: Live, Neutral & Earth.

Class 2: (Double Insulated Appliances) are protected against electric shock by basic insulation and additional safety precautions such as double insulation or reinforced insulation. There is no earth in Class 2 appliances and the supply cable has only 2 wires: live and neutral.

Class 3: Appliances which, for protection against electric shock, rely on the supply from a safety extra low voltage (SELV) source. SELV voltages will not exceed 50 V and they will often need to be under 24 V or even 12 V.

Note! Photographs in this catalogue may slightly differ from the instruments at the time of delivery.
Subject to technical change without notice.

METREL®
Measuring and Regulation
Equipment Manufacturer

METREL d.d.
Ljubljanska 77
SI-1354 Horjul
Tel: + 386 (0)1 75 58 200
Fax: + 386 (0)1 75 49 226
E-mail: metrel@metrel.si
http://www.metrel.si

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